1970 OPERATING SUMMARY

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ONTARIO WATER
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UNION

water system

ONTARIO WATER RESOURCES COMMISSION
Division of Plant Operations

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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water treatment plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

DS Caverly

D. S. Caverly,
General Manager.

D McTavish

D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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135 St. Clair Avenue West
Toronto 195

UNION
water system

operated for the

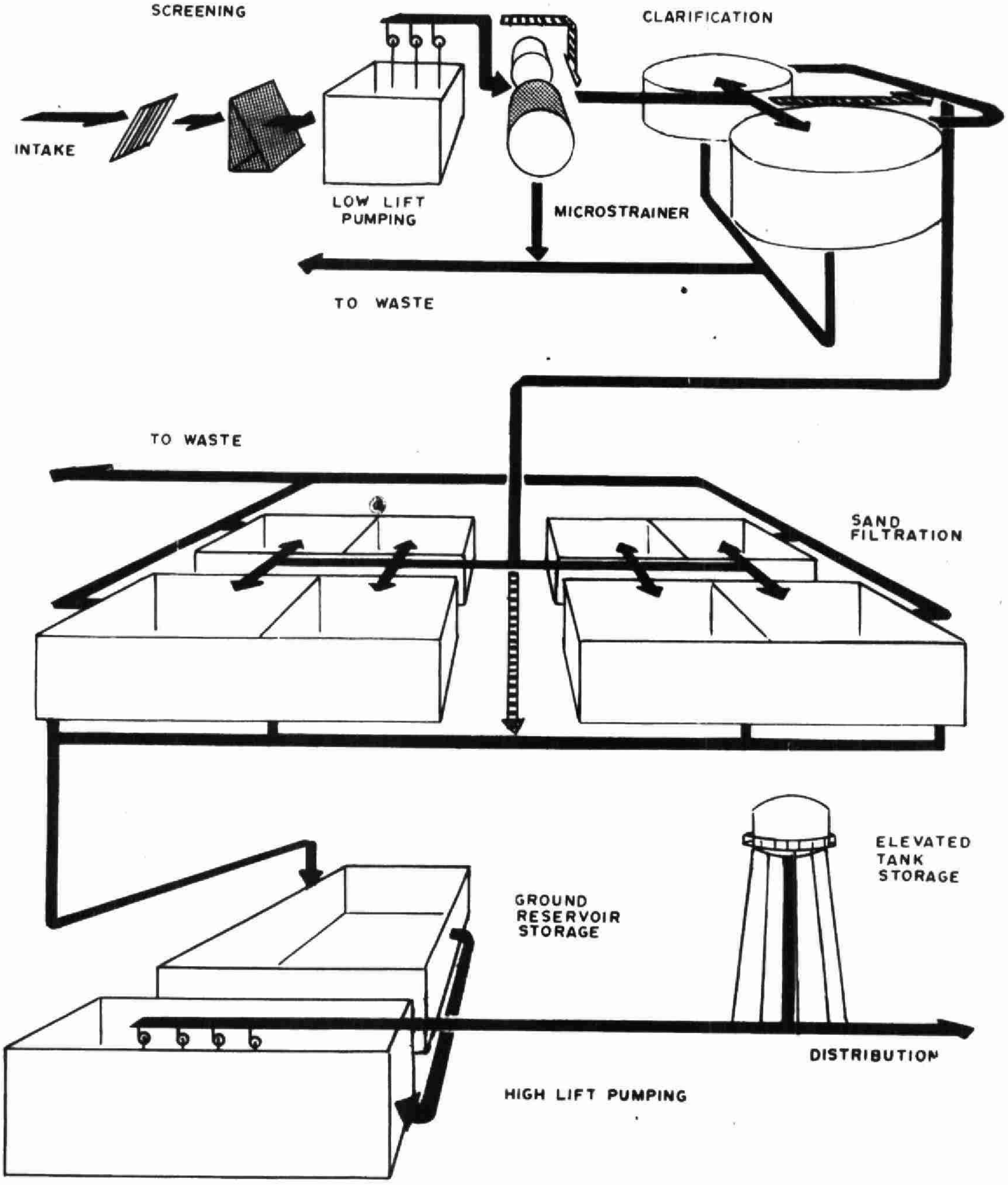
TOWN OF LEAMINGTON
TOWN OF ESSEX
TOWNSHIP OF GOSFIELD NORTH
TOWNSHIP OF GOSFIELD SOUTH
TOWNSHIP OF MAIDSTONE
TOWNSHIP OF MERSEA
H. J. HEINZ COMPANY OF CANADA LIMITED

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

UNION WATER TREATMENT PLANT



DESIGN DATA *

NOMINAL CAPACITY

10.0 MIGD

RAW WATER SOURCE

Lake Erie

CAPACITY OF UNITS

Intake: 32 mgd @ 3.5 ft/sec avg. vel.
Low Lift Pumps: 14.6 mgd @ 132 ft TDH
Microstrainers: 16.0 mgd
Clarifiers: 16.0 mgd
Filters: 8.0 mgd @ 2.15 gpm/ft^2
Backwash Pump: 5520 USGPM @ 35 ft TDH
High Lift Pumps: 24.3 mgd @ 200 ft. TDH

INTAKE

10' dia. steel bellmouth in 18' x 18' timber crib
Depth above crib - 15 ft (minimum)
Pipe Size: 1400 ft of 54" dia asbestos coated corrugated steel pipe-about ¼ mile to plant.

SCREENING

Coarse Screens - 3" cc
Fine Screens - ¼" mesh travelling screens

LOW LIFT PUMPING

#1 - 2.16 mgd @ 100' TDH
#2 - 4.32 mgd @ 100' TDH
#3 - 4.32 mgd @ 100' TDH
#4 - 2.16 mgd @ 100' TDH
#5 - 6.00 mgd @ 135' TDH

MICROSTRAINING

Two Glenfield 10 ft dia x 10 ft with MKI (35 micron) fabric @ 16.0 mgd total capacity

CLARIFICATION

One Graver and one Eimco Reactivator, each 94 ft dia x 19 ft swd
Volume: 1.65 mil gal
Detention: 2.5 hr @ 16.0 mgd
Overflow: 1160 gpd/ft^2 @ 16.0 mgd

FILTRATION

Type: Gravity sand filter - 27" sand depth
Size: Four 18' x 36' double filters
Rate: 2.15 gpm/ft^2 @ 8.0 mgd (nominal capacity)
Backwash Rate: 13 gpm/ft^2
Jet wash - Palmer surface jet wash

CHLORINATION

Three Wallace & Tiernan 2000 lb/day chlorinators

HIGH LIFT PUMPING

#6 - 2.60 mgd @ 200' head
#7 - 3.75 mgd @ 200' head
#8 - 5.19 mgd @ 200' head
#9 - 10.35 mgd @ 200' head
#10 - 1.15 mgd @ 200' head

STORAGE

Reservoir: 1.73 mil gal
Elevated Tank: 0.33 mil gal

*Note: As of November 1970

'70 REVIEW

GENERAL

Construction of the plant expansion was completed late in the year. The expansion included an additional low lift pump, clarifier and microstrainer and increased the nominal plant capacity from 7.6 mgd to 10.0 mgd.

EXPENDITURES

The total system operating cost of $159,234.94 was higher 9.0% than 1969 with the cost per thousand gallons treated increasing to 10.89 cents. The increase cost was due mainly to salary and chemical cost increases. These costs were based on the common area operating cost and the metered water to all participants.

PLANT FLOWS

(a) Plant Output

During 1970, the main plant meter was considered inaccurate and flows were only estimated based on pump outputs and running time. The resulting estimate was 1546.66 million gallons. This total is somewhat higher than the cumulative total for the area meters. Using the area total of 1462.72 million gallons, there was an increase in flows of 1.2 percent over 1969. The average daily flow of 4.02 million gallons represents 53 percent of the plant design capacity before expansion. The maximum daily flow of 8.59 million gallons which occurred prior to completion of the expansion represented 113 percent of plant design capacity for continuous operation.

(b) Consumption of Participants

Consumption by the Townships of Mersea and Maidstone were higher than in the last nine years. The Township of Gosfield South used about the same quantity as in its high year of 1967. Gosfield North's consumption was somewhat lower than its high in 1968. The consumption in Leamington remained close to its 1969 value and the H.J. Heinz flow dropped considerably due to a strike. The Town of Essex showed an increase over 1969.

As in the past few years, Mersea, Gosfield South and Maidstone used more than twice their contracted minimums, whereas Leamington was below its contract minimum for the third year in a row. These discrepancies will be adjusted with new contract minimums for 1971 as a result of the plant expansion agreement and the entries of Kingsville and Rochester Township as participants.

(c) Peak Demands

Peak demands on the plant during 1970 reached critical levels for periods of from 12 hours to one month as follows, assuming 80% capacity to be critical.

Period	Rated Capacity MGD	Date	Demand MGD	% of Capacity
4 hours	19.6	Aug. 26	10.35	53
6 hours	13.6	Aug. 26	10.35	76
12 hours	11.6	Aug. 26	9.65	83
1 day	9.6	Sept. 10	8.59	89
2 days	8.6	Sept. 10 & 11	8.56	100
3 days	8.3	Sept. 9 to 11	8.40	101
4 days	8.1	Sept. 9 to 12	8.25	102
5 days	8.0	Sept. 8 to 12	8.17	102
6 days	7.9	Sept. 7 to 12	7.87	100
10 days	7.9	Aug. 12 to 21	7.54	95
1 month	7.8	August	6.56	86

PROCESS CHEMICALS

A total of 56,800 gallons of 50% alum solution was used as a coagulant in the operation of the clarifier during 1970. The average dosage was 33 mg/l or 24.5 ppm, with the dosage, while running, ranging from 28 to 37 mg/l. These values are higher than the 1969 average dosages of 27 mg/l or 20 ppm.

A total of 2,350 lbs. of activated carbon at an average dosage of 3.6 mg/l was needed for taste and odour control from July through November.

A total of 16,500 lbs. of sodium silicate at an average dosage of 2.8 mg/l and 2950 lbs. of sodium bicarbonate at an average dosage of 0.7 mg/l were used to produce activated silica which was used as a coagulant aid when alum alone would not produce the desired results.

A total of 40,200 lbs. of chlorine was used during 1970. The dosage for pre-chlorination was 1.7 mg/l and for post chlorination was 0.5 mg/l to produce a residual of 0.5 mg/l in the treated water pumped to the distribution system.

WATER QUALITY

The raw water hardness is in the range considered as moderately hard and did not change significantly from 1969. Alkalinity of the raw water was slightly lower in 1970 than in the previous year. Hardness, alkalinity, pH, chloride, and fluoride are not altered significantly by the treatment process now in use.

The iron content of the raw water was lower in 1970 than in 1969 and treatment resulted in water well below the recommended limit of 0.3 mg/l.

Analyses for nitrogen and phosphorus on a regular basis was initiated in 1970 to provide background information for future reference. These constituents are not present in significant amounts at present.

The raw water colour and turbidity were relatively unchanged from the previous year and although treatment was not as effective in the removal of turbidity as in 1969, the average concentration of both colour and turbidity in the treated water was maintained within the desirable standards.

Samples of raw and treated water tested for mercury did not show the presence of this element.

Raw water coliform concentrations averaged 130 per 100 ml (geometric mean). Only four samples of 472 showed presence of low concentrations of coliforms in the distribution system.

The average algae concentration in the raw water was 5150 or slightly higher than in 1969. Treatment was very effective, removing the 99.75% of the algae from the water. It should be noted that the raw water algae concentration is quite high in comparison to most areas in the Great Lakes.

CONCLUSIONS

During 1970, before completion of the plant expansion, the maximum demand equalled or exceeded 100% of the plant capacity over periods of 2 to 6 days, up approximately 12% from 1969. The normally critical demand period resulting from high irrigation usage was again averted because of adequate rainfall during this period. The peak month of August averaged 86% of plant capacity as compared to 70% during 1969. However the total demand for the year did not change significantly over 1969. The cost of production increased from 10.11 cents per 1,000 gallons to 10.89 cents.

Although usage of chemicals for clarification increased over 1969, removals of turibidity, and iron were not as complete. Overall raw water quality does not appear to be changing much over the years.

Treated water continued to remain at high quality levels throughout the year.

project costs and flows to participants

PROJECT COSTS

NET CAPITAL COST (Estimated)	$3,841,799.96

Note: The participants' share of net capital cost varies each year on the basis of consumption.

DEBT RETIREMENT BALANCE AT CREDIT (Sinking Fund) December 31, 1970

Essex	$ 109,482.13
Leamington	173,307.57
H. J. Heinz	237,368.08
Gosfield North	18,574.80
Gosfield South	38,014.41
Mersea	68,221.75
Maidstone	20,286.95
TOTAL	$ 665,255.69

1970 COSTS TO EACH PARTICIPANT

TOTAL

Essex	$ 68,023.60
Leamington	116,838.70
H. J. Heinz	165,588.71
Gosfield North	12,824.89
Gosfield South	29,389.82
Mersea	49,859.67
Maidstone	15,983.84
	$ 458,509.23

NET OPERATING

Essex	$19,008.14	
Leamington	40,673.62	
H.J. Heinz	58,572.66	
Gosfield North	3,636.11	
Gosfield South	10,170.62	
Mersea	15,426.85	
Maidstone	3,086.75	
		$150,574.75

DEBT RETIREMENT

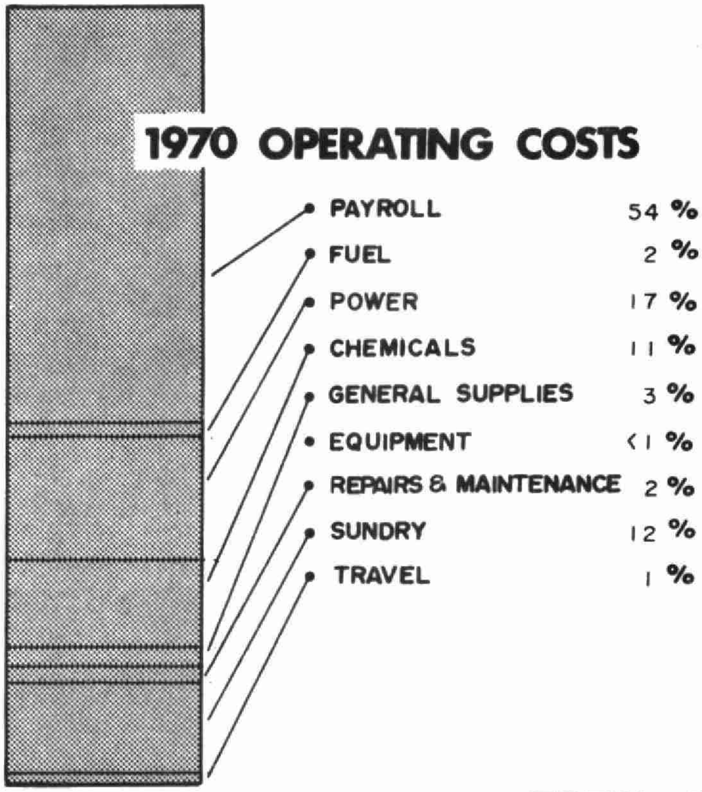
Essex	$12,288.07	
Leamington	19,300.52	
H.J. Heinz	27,920.89	
Gosfield North	2,335.14	
Gosfield South	4,727.92	
Mersea	7,950.76	
Maidstone	3,003.70	
		$ 77,527.00

RESERVE

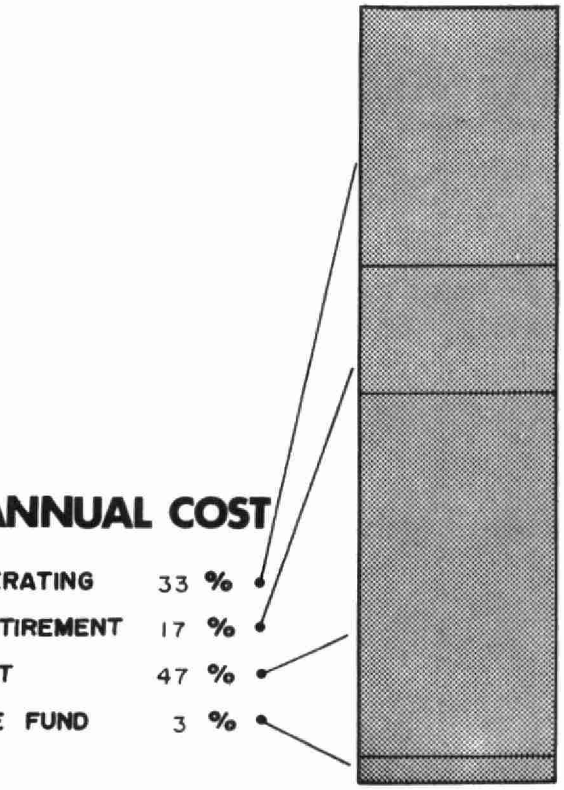
Essex	$ 2,581.24	
Leamington	3,377.08	
H.J. Heinz	5,351.09	
Gosfield North	529.55	
Gosfield South	1,104.49	
Mersea	1,608.34	
Maidstone	613.16	
		$ 15,165.95

INTEREST CHARGED

Essex	$34,146.15	
Leamington	53,487.48	
H.J. Heinz	73,744.07	
Gosfield North	6,324.09	
Gosfield South	13,386.79	
Mersea	24,872.72	
Maidstone	9,280.23	
		$215,241.53
TOTAL COST		$458,509.23



1970 OPERATING COSTS



TOTAL ANNUAL COST

Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER THOUSAND GALLONS
1966	1486.51	$123,341.12	$ 8.30
1967	1506.65	130,349.36	8.65
1968	1465.52	137,283.49	9.37
1969	1445.28	146,059.93	10.11
1970	1546.66	159,234.94	10.89

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY	TRAVEL
JAN	12590.83	9078.72	-	410.10	2143.56	495.50	333.36	-	-	129.59	-
FEB	10265.85	6608.30	-	527.88	1933.46	540.00	250.93	-	67.30	194.33	143.65
MAR	10001.49	6421.47	-	442.97	1815.32	85.87	771.80	-	250.88	133.48	79.70
APR	9904.05	6506.06	32.00	360.32	1793.22	656.10	148.73	40.88	137.41	146.18	83.15
MAY	12679.20	7092.81	-	205.57	2258.84	1517.20	272.21	87.44	554.08	152.79	538.26
JUNE	8093.47	6437.77	-	259.43	120.00	735.59	64.05	-	(1.79)	383.17	95.25
JULY	13898.54	6181.43	-	58.07	4046.35	2401.66	416.61	-	154.45	523.77	116.20
AUG	13606.88	9354.10	-	-	2386.66	579.83	323.07	-	626.50	261.15	75.57
SEPT	13322.27	6221.06	-	44.09	3008.56	945.07	422.65	-	74.23	2549.98	56.63
OCT	27056.34	6193.08	-	-	2865.82	973.68	137.23	133.88	1235.83	15333.15	183.67
NOV	14832.22	6209.34	-	141.73	2200.78	5607.25	344.56	71.04	107.16	73.84	76.52
DEC	12983.80	6301.70	-	430.90	2257.18	3551.56	929.29	97.11	360.36	(1083.53)	139.23
TOTAL	159234.94	82605.84	32.00	2881.06	26829.75	18089.31	4414.49	430.35	3566.41	18797.90	1587.83
UNION EAST	130.96	-	-	-	127.64	-	-	-	-	3.32	-
UNION WEST	649.15	-	-	-	409.35	-	-	-	-	239.80	-
GRAND TOTAL	160015.05	82605.84	32.00	2881.06	27366.74	18089.31	4414.49	430.35	3566.41	19041.02	1587.83

ANNUAL CONSUMPTION BY PARTICIPANTS

PARTICIPANT	MINIMUM ANNUAL QUOTA REVISIONS				ANNUAL CONSUMPTION in millions of gallons and as percent of total (listed below)									
	ORIGINAL	REVISED Jan. 1, 63	PLANT EXPANSION Nov 1, 70	KINGSVILLE and ROCHESTER Entry-Jan 1, 71	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
H. J. HEINZ	520	520	520	520	594.00 40.0	572.23 38.0	573.48 39.1	578.71 40.0	551.59 37.7					
LEAMINGTON	426	400	400	380	416.38 28.0	416.57 27.6	391.85 26.7	278.71 26.2	379.09 25.9					
ESSEX	160	160	180	180	179.12 12.0	195.49 13.0	197.82 13.5	184.72 12.7	188.12 12.9					
MERSEA	12.5	70	140	140	158.53 10.7	165.23 11.0	160.61 11.0	152.48 10.6	173.64 11.9					
GOSFIELD S	16.5	40	100	100	87.37 5.9	102.66 6.8	83.12 5.7	93.82 6.5	102.49 7.0					
GOSFIELD N	23.5	20	35	35	32.93 2.2	31.06 2.1	35.82 2.4	27.81 1.9	31.87 2.2					
MAIDSTONE **See Note C**	12	10	20	20	11.48	14.72	13.70	18.56	23.17					
KINGSVILLE **See Note A**	–	–	–	133	– –	– –	– –	– –	– –					
ROCHESTER **See Note B**	–	–	–	14	6.71	8.70	9.12	11.47	12.74					
TOTAL	1170.5	1220	1395	1522	1486.52	1506.66	1465.52	1445.28	1462.72					

Note A – **Kingsville became participant** Jan 1/71, however water is not available until completion of project.

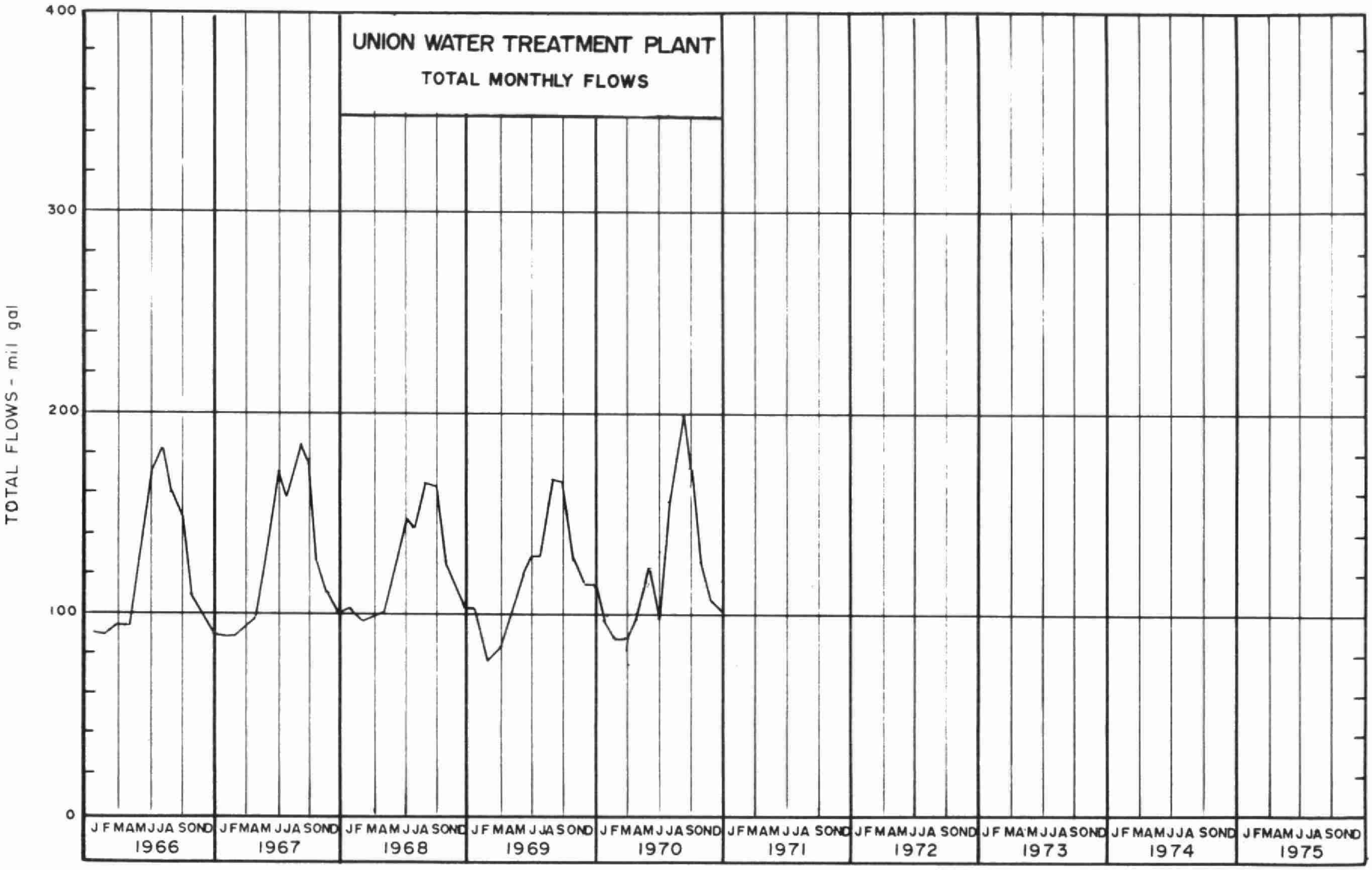
B – Rochester became participant Jan 1/71, purchased water through Maidstone prior to this date.

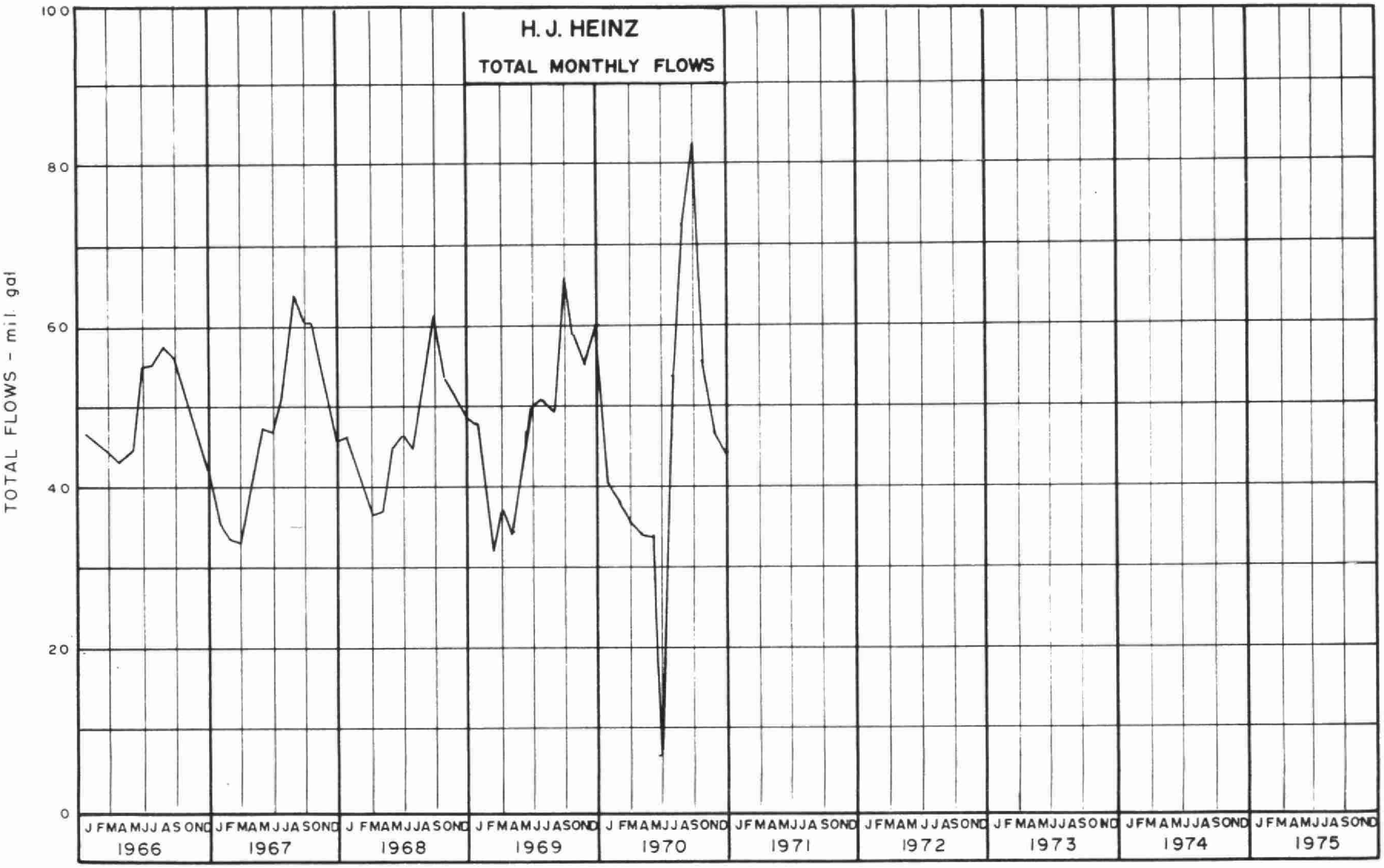
C – Rochester flows have been deducted from Maidstone flows.

ADJUSTED MONTHLY FLOWS

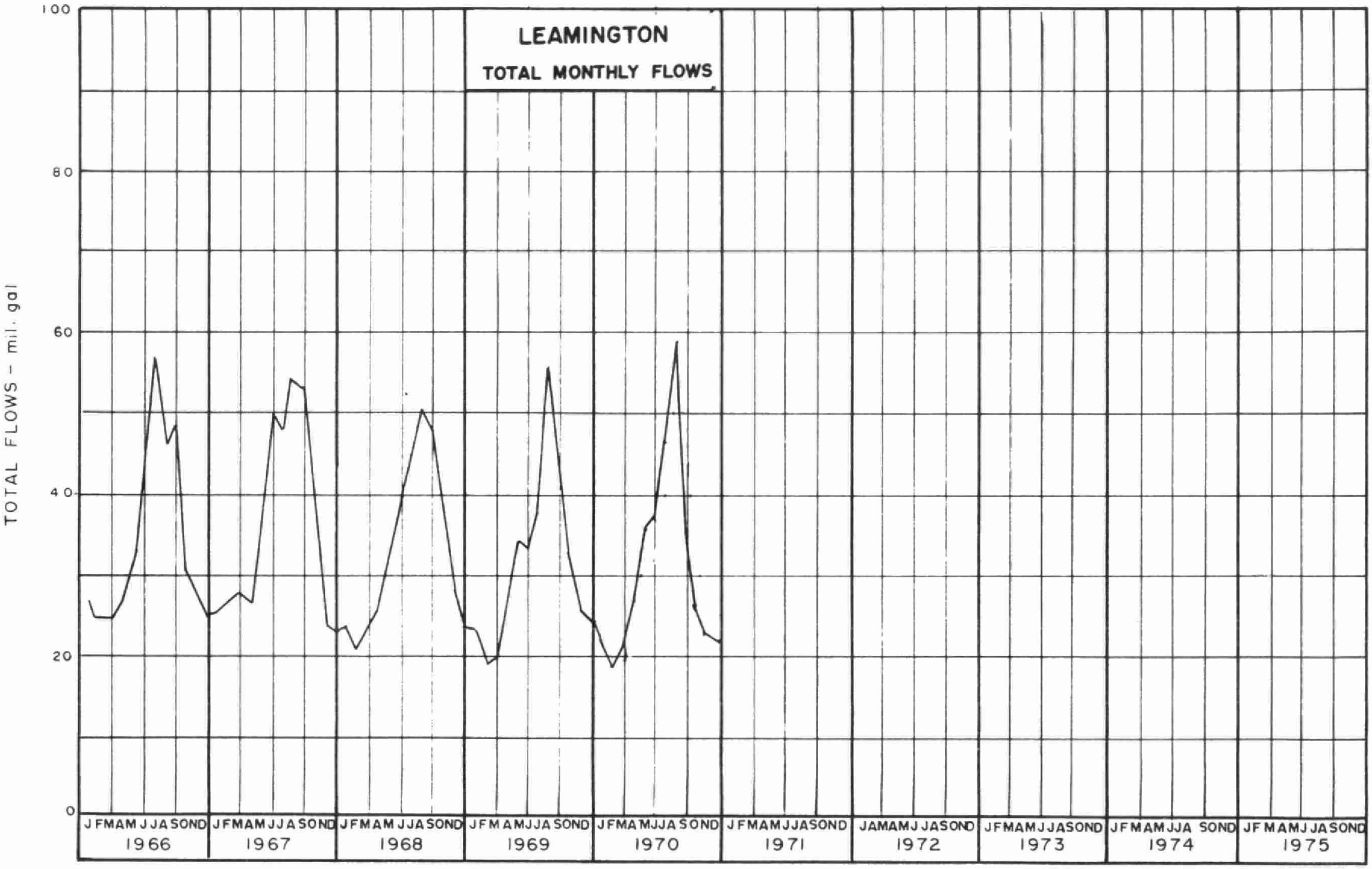
In million gallons unless otherwise noted.

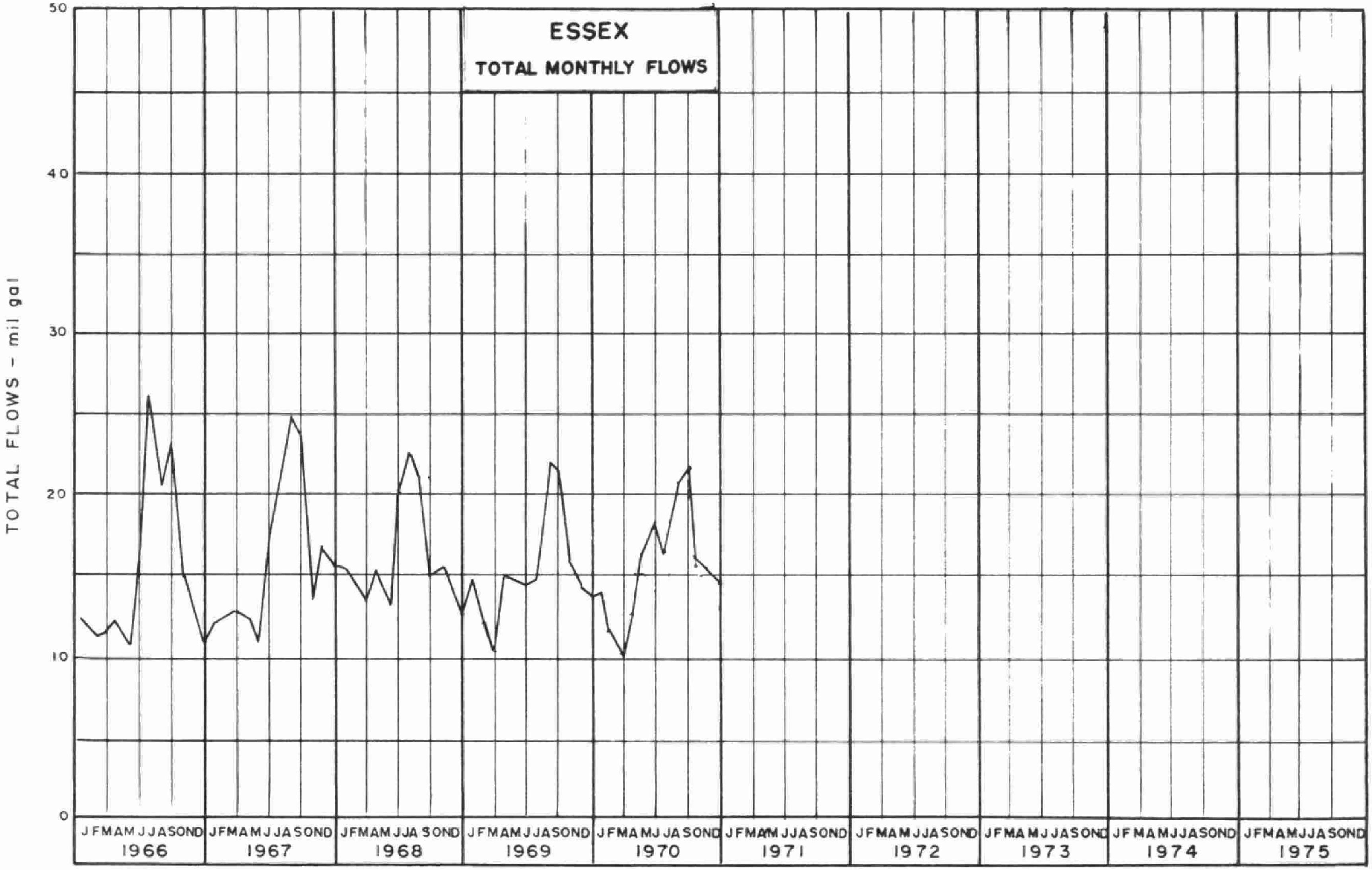
MONTH	H.J. HEINZ	LEAMINGTON	ESSEX	MERSEA	GOSFIELD SOUTH	GOSFIELD NORTH	MAIDSTONE and ROCHESTER	TOTAL
JANUARY	40.017	22.530	14.029	11.420	4.526	3.548	3.064	99.134
FEBRUARY	38.294	19.039	11.855	9.651	3.824	2.999	2.589	88.251
MARCH	36.392	21.832	10.203	10.381	5.630	2.077	2.109	88.624
APRIL	34.963	27.118	12.674	12.895	6.994	2.581	2.620	99.846
MAY	34.247	35.884	16.857	18.850	10.114	2.629	3.485	122.066
JUNE	7.722	37.499	17.616	19.699	10.569	2.747	3.641	99.493
JULY	54.838	47.512	16.730	18.902	13.663	2.216	3.296	157.157
AUGUST	72.692	59.017	20.782	23.479	16.971	2.753	4.095	199.789
SEPTEMBER	82.940	35.835	21.570	16.041	11.339	2.791	3.299	173.815
OCTOBER	56.636	26.704	16.074	11.953	8.449	2.080	2.458	125.354
NOVEMBER	47.212	23.750	15.310	10.492	5.362	2.808	2.706	107.640
DECEMBER	44.640	22.366	14.419	9.880	5.049	2.644	2.548	101.546
TOTAL	551.594	379.086	188.119	173.643	102.490	31.874	35.910	1462.716
MAX. MONTHLY QUOTA in mil gal (eff. JAN 1/71)	81.998	59.921	28.385	22.075	15.768	5.520	3.154 + 2.208	240.0
MAX. DAILY QUOTA in 1000 gal (eff. JAN 1/71)	3205.0	2342.0	1109.0	864.0	616.4	215.8	123.3 + 86.3	8561.8
MAXIMUM MONTH'S AVERAGE FLOW in 1000 gpd	2760.0	1900.0	720.0	756.0	546.0	114.0	132.0	6420.0

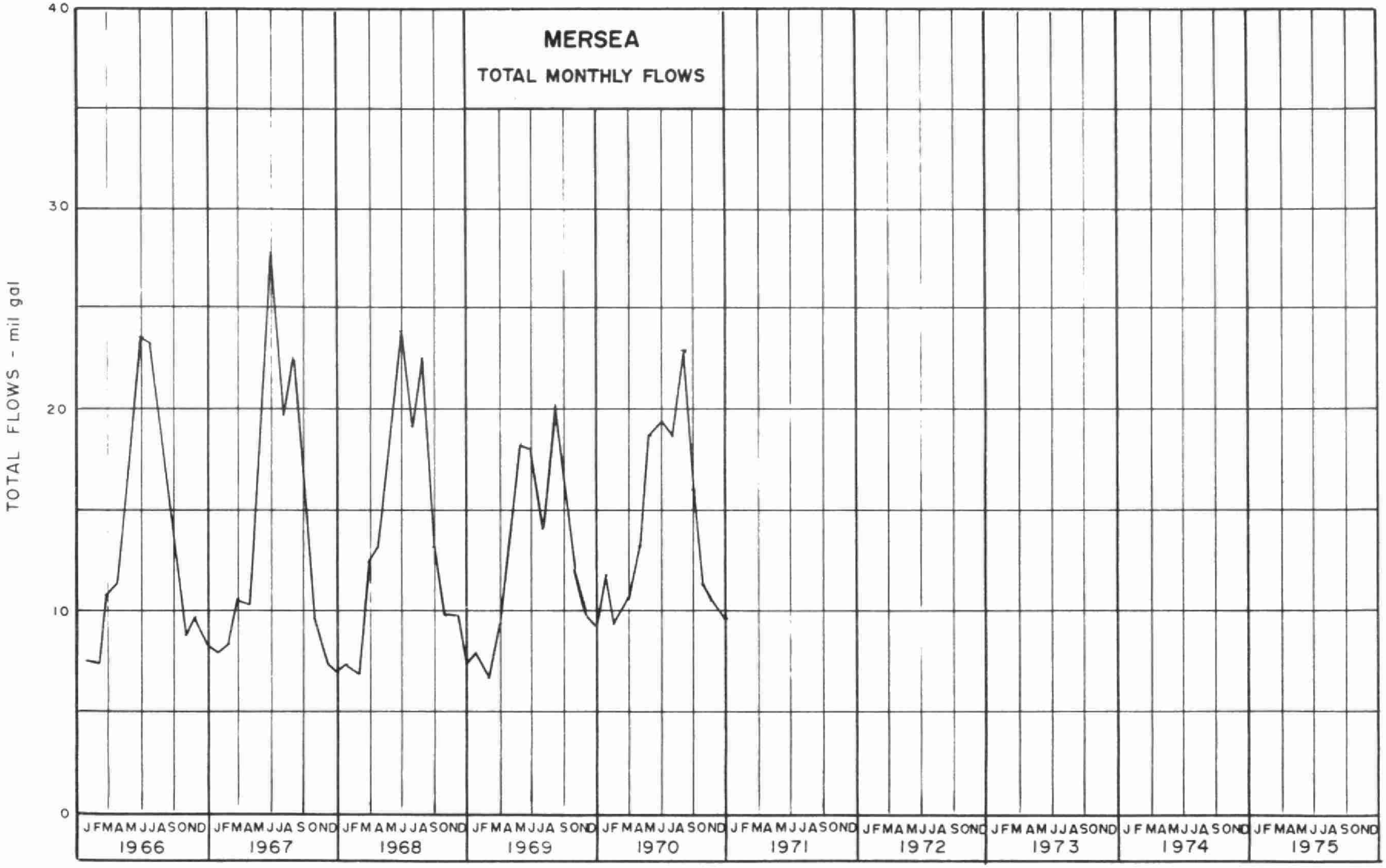

UNION WATER TREATMENT PLANT
TOTAL MONTHLY FLOWS
TOTAL FLOWS - mil gal
400
300
200
100
0
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975

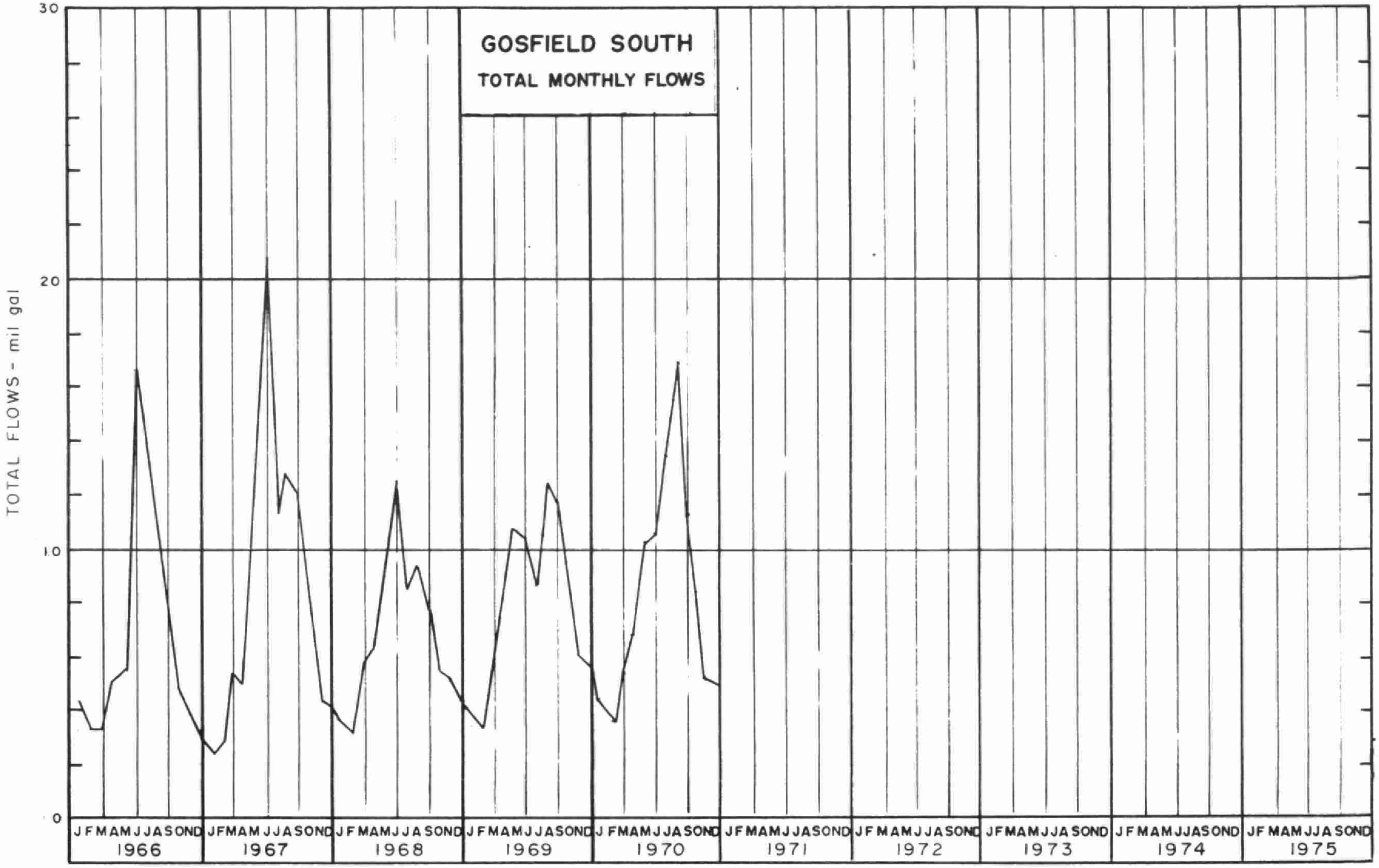

H. J. HEINZ

TOTAL MONTHLY FLOWS

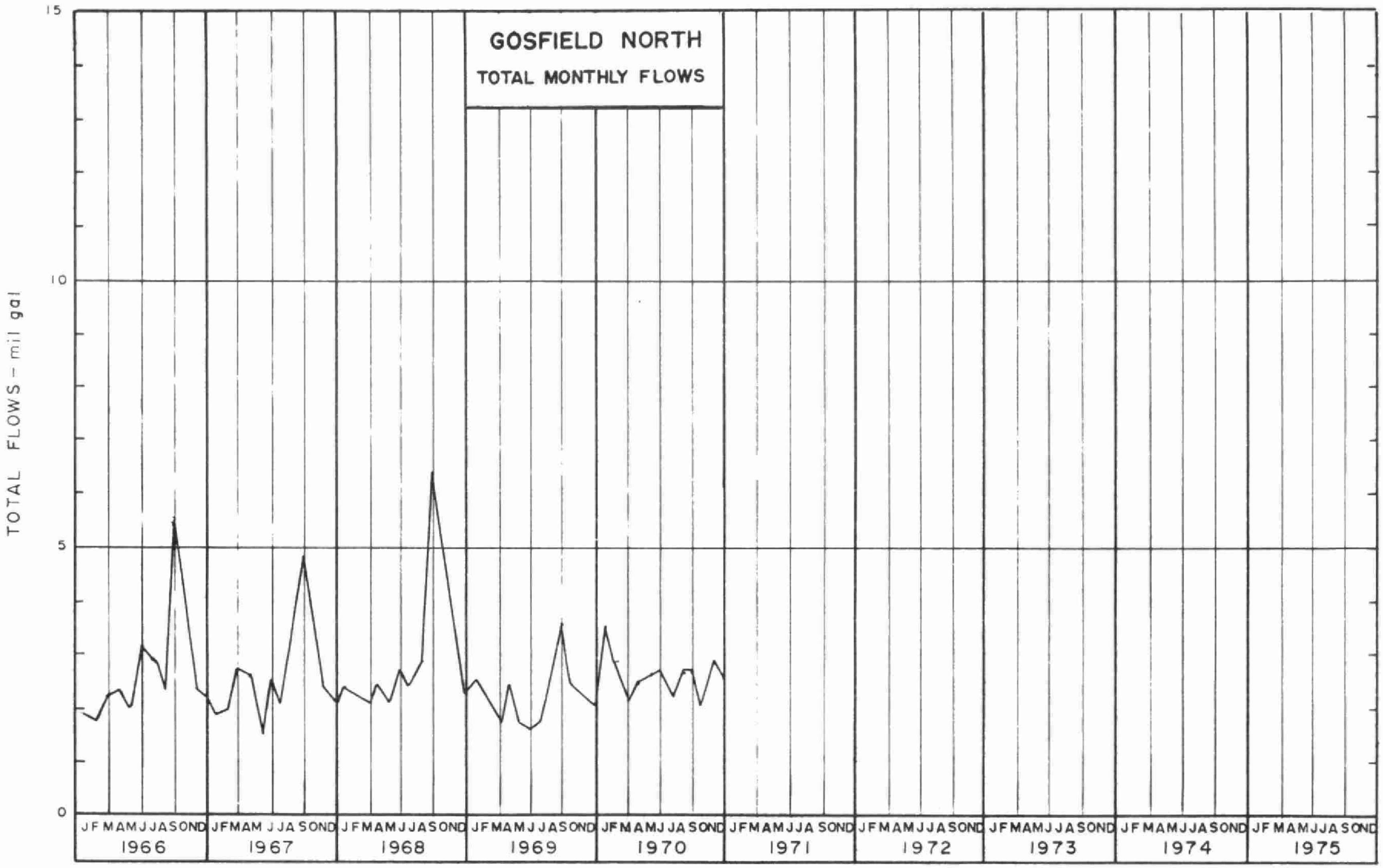

LEAMINGTON
TOTAL MONTHLY FLOWS

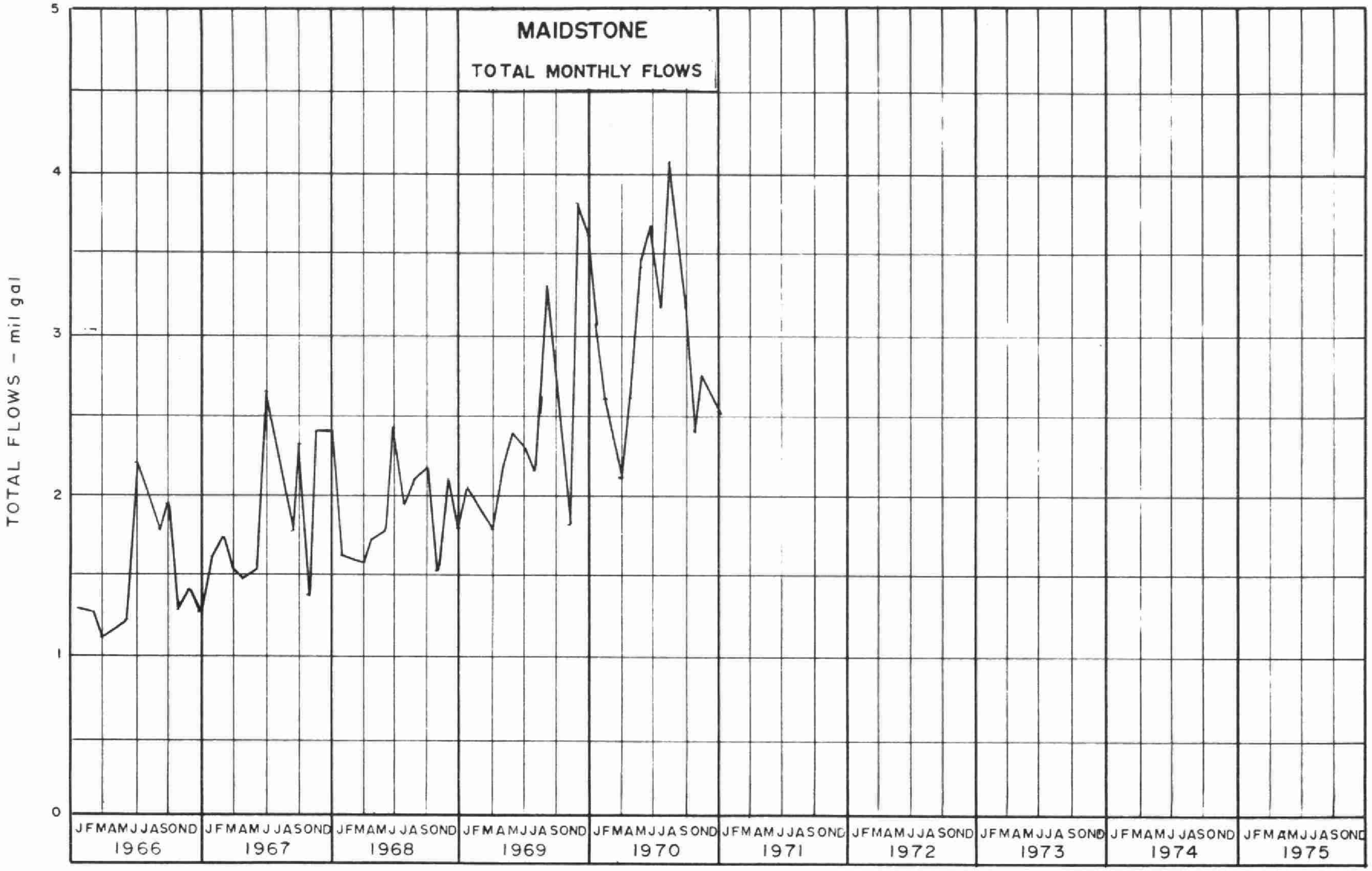

ESSEX
TOTAL MONTHLY FLOWS
TOTAL FLOWS - mil gal
50
40
30
20
10
0
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975


MERSEA
TOTAL MONTHLY FLOWS
TOTAL FLOWS - mil gal
40
30
20
10
0
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975

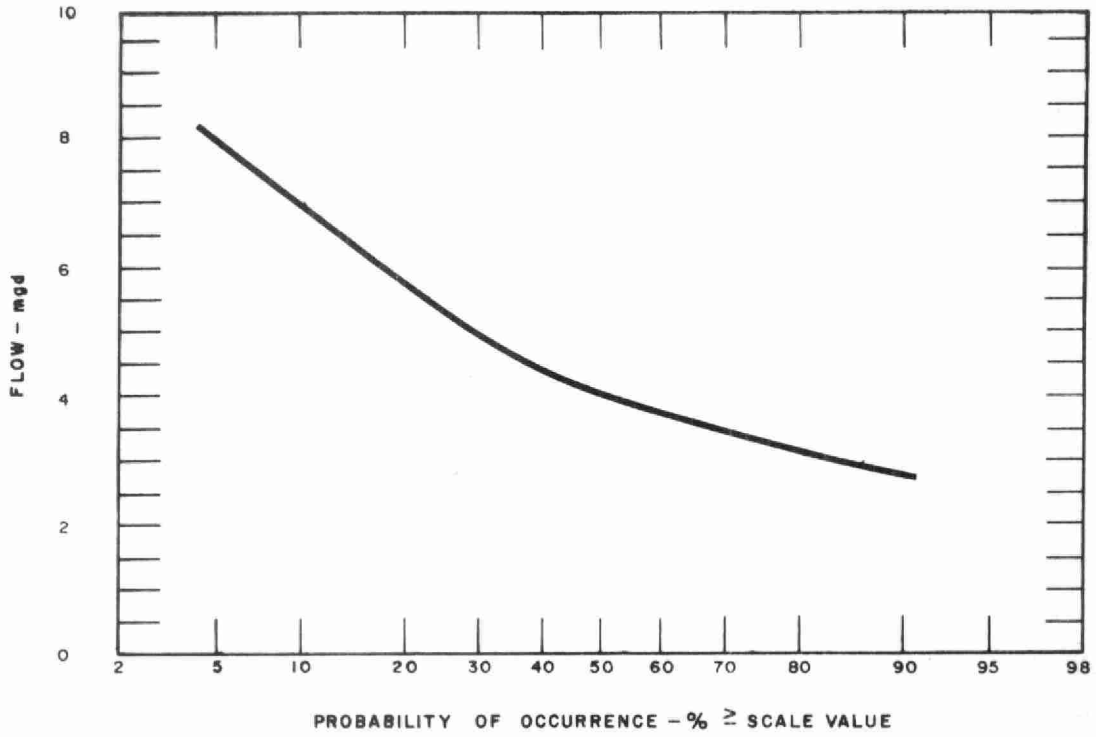


GOSFIELD SOUTH
TOTAL MONTHLY FLOWS
TOTAL FLOWS - mil gal
30
20
10
0
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975


GOSFIELD NORTH
TOTAL MONTHLY FLOWS
TOTAL FLOWS - mil gal
15
10
5
0
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975

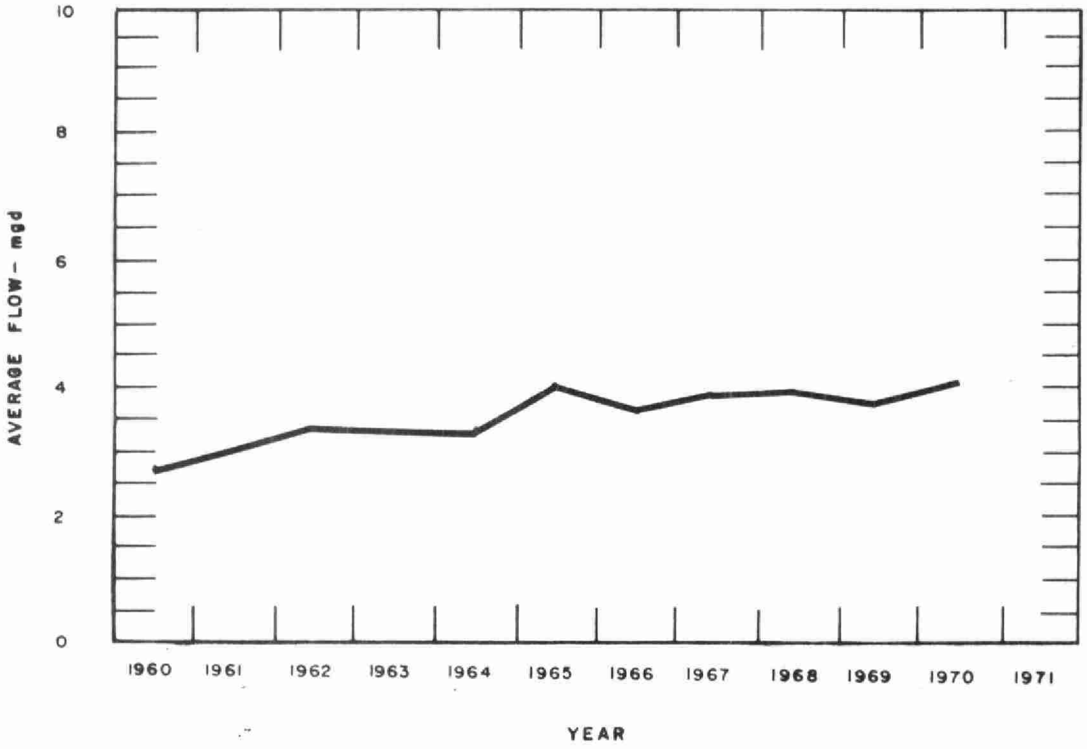

MAIDSTONE
TOTAL MONTHLY FLOWS
TOTAL FLOWS - mil gal
0
1
2
3
4
5
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975

PROCESS DATA



FLOWS

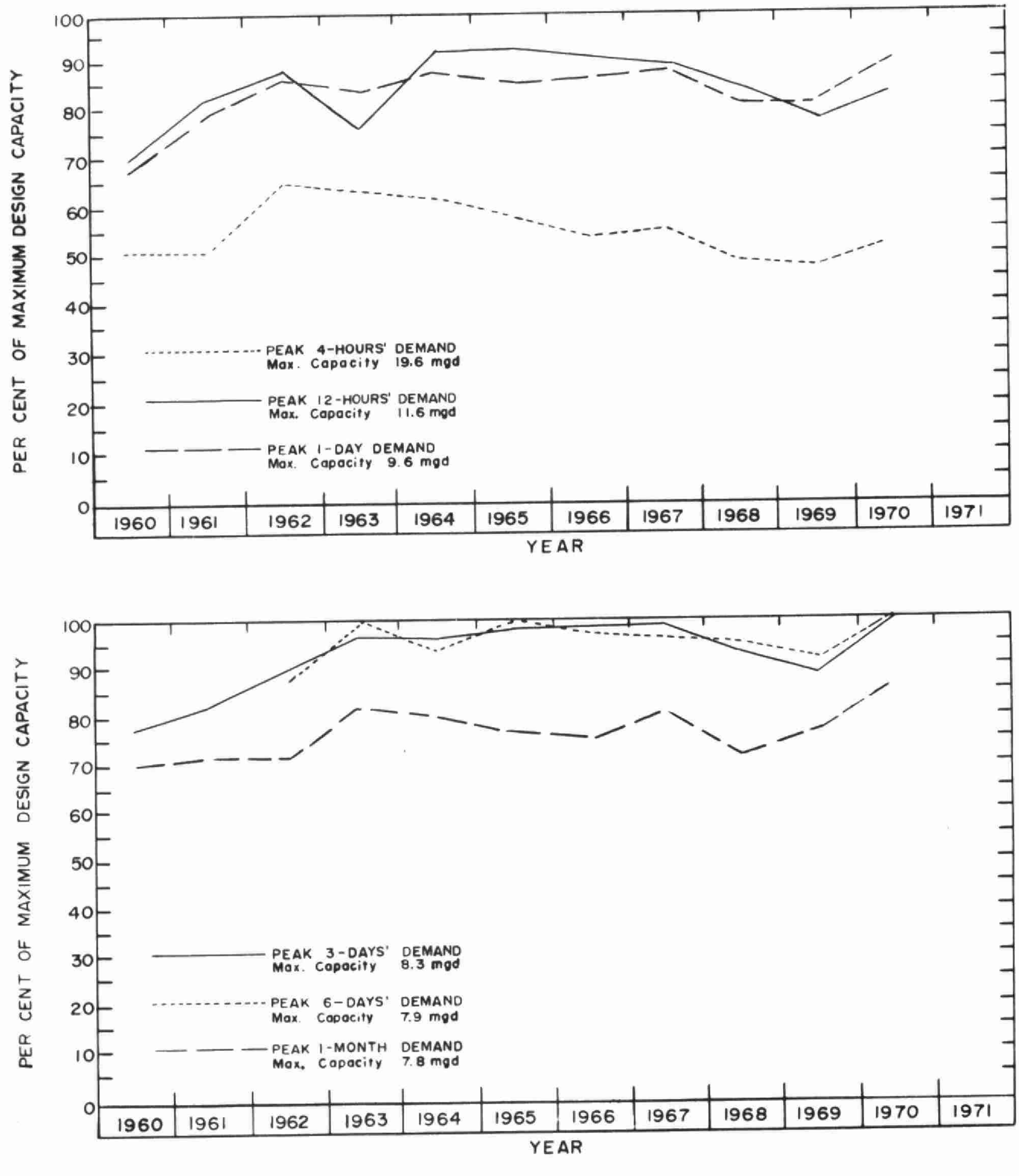
NOMINAL CAPACITY 10.0 MGD



GRAPH No. 9 PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

(BASED ON PLANT METER)

NOTE: DESIGN MAXIMUM CAPACITIES ASSUME IDEAL CONDITIONS AND DO NOT ALLOW FOR BACKWASHING, DOWN-TIME OF EQUIPMENT, OR PERIODS OF HIGH TURBIDITY AND ALGAE.



PLANT FLOWS

IN MILLIONS OF GALLONS

Based on METER No. I and estimated flows when the meter was out of operation.

MONTH	TOTAL FLOW	CUMULATIVE TOTAL	AVERAGE DAY	MAXIMUM DAY	MINIMUM DAY
JANUARY	104.58	104.58	3.36	4.29	2.08
FEBRUARY	92.40	196.98	3.30	4.11	2.00
MARCH	100.71	297.69	3.27	4.71	1.99
APRIL	112.85	410.54	3.74	5.14	2.18
MAY	127.76	538.30	4.12	6.27	1.76
JUNE	108.43	646.73	3.60	6.23	2.11
JULY	157.41	804.14	5.06	6.80	2.67
AUGUST	201.80	1005.94	6.51	8.55	1.75
SEPTEMBER	183.05	1188.99	6.11	8.59	2.80
OCTOBER	131.40	1320.39	4.23	5.82	2.69
NOVEMBER	122.90	1443.29	4.10	5.14	2.63
DECEMBER	103.37	1546.66	3.34	5.47	2.11
TOTAL	1546.66	1546.66	-	-	-
AVERAGE	128.89	-	4.23	MAXIMUM DAY 8.59	MINIMUM DAY 1.75

CHLORINATION and DISINFECTION

MONTH	RAW WATER					PLANT EFFLUENT		DISTRIBUTION SYSTEM		CHLORINATION			
	NUMBER OF SAMPLES WITH COLIFORMS PER 100 ml OF:					No. of Samples Taken	No. with Coliform Organisms	No. of Samples Taken	No. with Coliform Organisms	CHLORINE USED 10^3 lb	DOSAGE		RESIDUAL in Plt. Eff. mg/l
	0	1 - 4	4 - 32	32-320	> 320						pre- mg/l	post mg/l	
JAN			1	3		4	0	41	0	1.6	1.0	.4	.5
FEB			1		3	4	0	42	0	1.3	1.0	.4	.5
MAR			1	3	1	5	0	52	0	1.6	1.1	.4	.5
APR				2	2	4	0	44	0	1.9	1.2	.6	.5
MAY			1	2	1	4	0	42	1	3.3	1.6	.5	.5
JUNE	1		3			4	0	41	0	3.8	2.2	.6	.5
JULY			1		2	3	0	30	0	4.3	2.0	.6	.5
AUG	1		1		2	4	1	39	0	8.6	2.7	.8	.5
SEPT				1	3	4	0	38	1	6.0	2.6	.7	.5
OCT				1	2	3	0	26	1	3.5	2.3	.5	.5
NOV					4	4	0	39	1	2.6	1.4	.5	.5
DEC	1			3		4	0	38	0	1.7	1.5	.5	.5
TOTAL						47	1	472	4	40.2			
AVERAGE	(NOTE: Geometric Mean) 130 Coliforms/100 ml									3.3	1.7	.5	.5

CHEMICALS USED

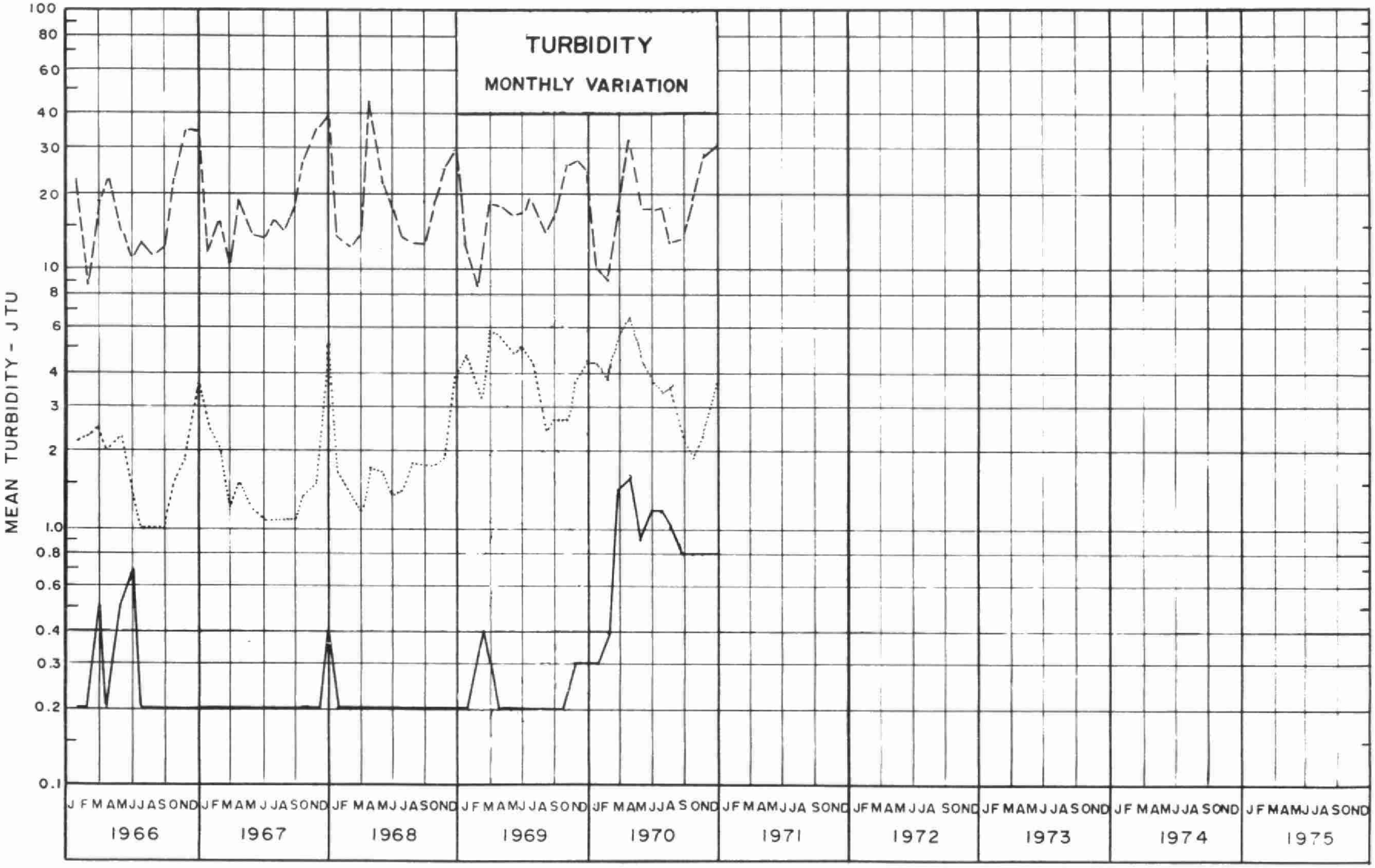
MONTH	ALUM as $Al_2(SO_4)_3 14H_2O$			ACTIVATED CARBON			SODIUM SILICATE			SOD. BICARBONATE		
	VOLUME* 10^3 gal.	DOSE mg/l	No. of DAYS	AM'T. USED lb	DOSE mg/l	No. of DAYS	AM'T. USED 10^3 lb	DOSE mg/l	No. of DAYS	AM'T. USED lb	DOSE mg/l	No. of DAYS
JANUARY	2.4	37	16	0	0	0	0	0	0	0	0	0
FEBRUARY	0	-	0	0	0	0	0	0	0	0	0	0
MARCH	1.0	28	9	0	0	0	.4	2.0	6	160	.8	6
APRIL	5.0	35	30	0	0	0	2.3	2.9	21	610	.8	21
MAY	5.7	36	30	0	0	0	2.3	2.5	22	600	.8	22
JUNE	4.8	36	30	0	0	0	1.1	4.0	9	250	1.0	9
JULY	6.1	32	31	500	4.1	2	2.0	2.4	16	450	.6	16
AUGUST	8.5	30	31	550	1.7	2	1.9	1.7	15	420	.4	15
SEPTEMBER	8.0	34	30	300	2.7	2	1.9	2.2	15	420	.4	15
OCTOBER	5.4	33	31	800	5.6	3	1.5	2.8	12	340	.6	12
NOVEMBER	5.3	33	30	200	4.0	1	1.4	3.2	12	310	.7	12
DECEMBER	4.6	36	31	0	0	0	1.7	3.9	13	390	.9	13
TOTAL	56.8	-	299	2350	-	10	16.5	-	141	3950	-	141
AVERAGE	-	33	-	-	3.6	-	-	2.8	-	-	.7	-

NOTE: DOSAGES WHEN USED

* AS DELIVERED

TEMPERATURE and ALGAE

MONTH	TEMPERATURE Degrees Fahrenheit	TOTAL ALGAE in A.S.U. per 100 ml			
		RAW WATER	MICROSTRAINED	CLARIFIED	FILTERED
JANUARY	37	4140	1690	670	29
FEBRUARY	35	2260	–	1160	31
MARCH	35	6400	3380	2470	63
APRIL	42	6160	1680	790	14
MAY	56	7110	3240	1940	0
JUNE	68	4120	1340	260	0
JULY	74	5850	1730	1170	0
AUGUST	74	5660	3680	580	85
SEPTEMBER	71	7300	–	–	–
OCTOBER	61	4100	2260	800	0
NOVEMBER	48	4950	1100	290	31
DECEMBER	35	3820	1320	540	0
TOTAL	—	—	—	—	—
AVERAGE	53	5150	2140	970	13


TURBIDITY
MONTHLY VARIATION
MEAN TURBIDITY - JTU
100
80
60
40
30
20
10
8
6
4
3
2
1.0
0.8
0.6
0.4
0.3
0.2
0.1
J F M A M J J A S O N D
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975

WATER QUALITY

PROPERTY	RAW WATER				PLANT EFFLUENT				DESIRABLE STANDARDS
	Number of Samples	Average	Maximum	Minimum	Number of Samples	Average	Maximum	Minimum	
HARDNESS mg/l as $CaCO_3$	22	121	130	110	21	116	138	108	80 – 100
ALKALINITY mg/l as $CaCO_3$	21	83	95	70	21	76	98	62	30 – 100
IRON mg/l Fe	22	.89	4.25	.10	21	.09	.40	0	< 0.3
CHLORIDE mg/l Cl^-	22	23	30	18	21	24	33	20	< 250
pH units	22	7.9	8.2	7.5	21	7.6	8.2	7.2	7.0 – 8.5
FLUORIDE mg/l F	8	0.1	0.2	0.1	5	0.1	0.2	0.1	<1.2
AMMONIA mg/l N	10	.09	.24	.02	10	.04	.09	.02	<0.5
KJELDAHL NITROGEN mg/l N	10	.39	.50	2.6	10	.29	.68	.16	< 1
NITRITE mg/l N	10	.007	.012	.001	10	.003	.008	.001	
NITRATE mg/l N	10	.29	.49	.03	10	.30	.61	.01	<45
TOTAL PHOSPHORUS mg/l P	10	.052	.150	.030	10	.018	.048	.006	
SOLUBLE PHOSPHORUS mg/l P	10	.021	.027	.016	10	.009	.015	.004	
TURBIDITY JTU	365	18.9	32.4	8.0	365	.9	4.1	.2	<1.0
COLOUR (Apparent) units	12	15	80	5	11	5	5	5	< 5
MERCURY mg/l Hg	2	.00	.00	.00	1	.00	.00	.00	< 0.005

LABORATORY LIBRARY
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Date Due

Water management in Ontario